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THE NYMPH OF CINYGMA INTEGRUM AND DESCRIPTION OF A NEW HEPTAGENINE GENUS*

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The species, *integrum* Eaton, described from material collected in Washington and Oregon states, was designated by Eaton as the genotype of *Cinygma*. I have already (1926, Can. Ent. LVIII, 302) recorded the capture of adults of this species in the Coast range of British Columbia and at the time expressed some doubt as to whether all the species at present included in this genus were strictly congeneric. Since nymphal structures have been recognized by a number of recent workers as of great importance in furnishing distinguishing characters in the Heptagenine genera it was with considerable interest that I discovered among material collected in the Hope Mts., B. C. in 1932 by my assistant, Mr. A. N. Gartrell, a bred female adult of *integrum*, together with its nymphal exuvia, preserved in alcohol. A study of this exuvia soon convinced me that in the nymphal gills and mouth-parts there are excellent and in part unique structural details which should at once establish not only the validity of the genus but also its limitations and position in the group of allied genera.

As far as can be judged from the single well-preserved exuvia the nymph is deep brown in coloration, about 12 mm. long (exclusive of setae) and superficially very similar to nymphs of the genus *Heptagenia*. There are three setae; the gills are, as usual, seven in number, deep smoky in color, oblong-ovate, with a well-developed bunch of filaments on underside at base and a strongly defined tracheal system, the first gill is decidedly smaller than the others and there is no trace of any ventral extension of either the first or seventh gill-pair, such as is found in *Iron* or *Rhithrogena;* the postero-lateral edges of the abdominal segments are not extended into spine-like projections and the only abdominal maculation on each segment consists of a pair of fine, pale, dorsal, longitudinal dashes, followed by pale dots, the whole resembling an exclamation mark. The legs are normal; the femora slightly spiculate on dorsal surface and with a row of moderately long setae on the upper edge, they show irregular pale bands at middle and apex, the former being continued towards base by a pale streak; the tibiae are subequal in length to the femora and banded with pale before middle and at apex; the tarsus shows a darker apical shade and the claw has a strong median projection on the ventral side with a couple of small, subapically placed teeth. The mouth-parts (see figure 2), while they show relationship to *Heptagenia*, notably in the labial and maxillary palpi, possess other features which are quite unique; the maxillae are shaped quite differently from those of any other of our American Heptagenine genera, as a reference to the figure will show, and each of their opposing edges contains a semi-circular excavation bordered with a circlet of long hairs which would seem to have the function of a strainer of some sort; the mandibles show relation to *Heptagenia* in the shape of the fangs

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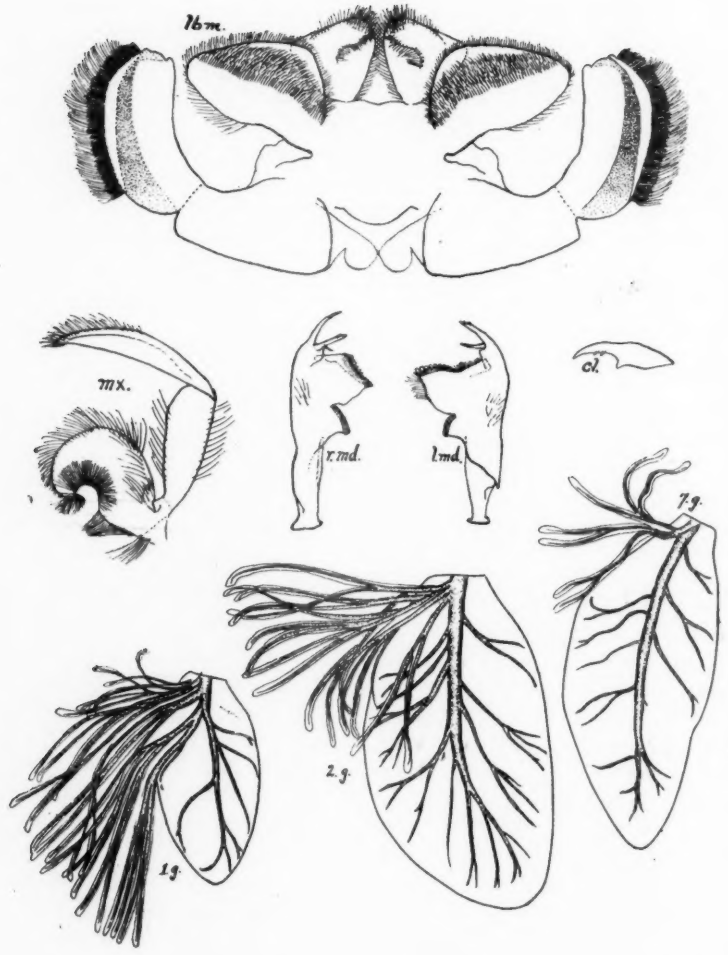


Structural details of the nymph of *Cinygma integrum* Eaton. lbm. labium; mx maxilla; r. md. right mandible; l. md. left mandible; cl. claw; lg, 2g, 7g, first, second and seventh gills.

but possess, basad of the molar region proper, opposed lobes of a heavily chitinized nature the presence of which I have not noted in allied genera; the triangular nature of the inner lobes of the labium is characteristic and to a lesser extent the shape of the apical portion of the labial palpi.

Based on the above details I believe the genus should be restricted to the two species, *integrum* Eaton and *lyriformis* McD.; of this latter species only the adult is known as yet but both pattern and genitalic structure point to a close association between the two. To my mind *Cinygma* is an offshoot from *Heptagenia,* separable from it in the adult by the much greater length of the first tarsal joint of the foreleg in the male and in the nymph by the above-mentioned differences in the mouth-parts.

If we except for the present the species *geminatum* Eaton, based on female specimens the identity of which is still doubtful to me, I believe that for the remaining species now included in the genus, viz.: *atlantica* McD., *minus* Eat., *par* Eat., *confusa* McD., *hyalina* McD., *ramaleyi* Dodds and *tarda* McD. a new generic term becomes necessary, for judging by the structural details of those nymphs known to me *(atlantica, confusa, ramaleyi)* and some others doubtfully associated *(par, mimus, tarda)* this group bears the same relationship to *Rhithrogena* that *Cinygma* does to *Heptagenia.* I characterize therefore the new genus as follows:

Cinygmula gen. nov.

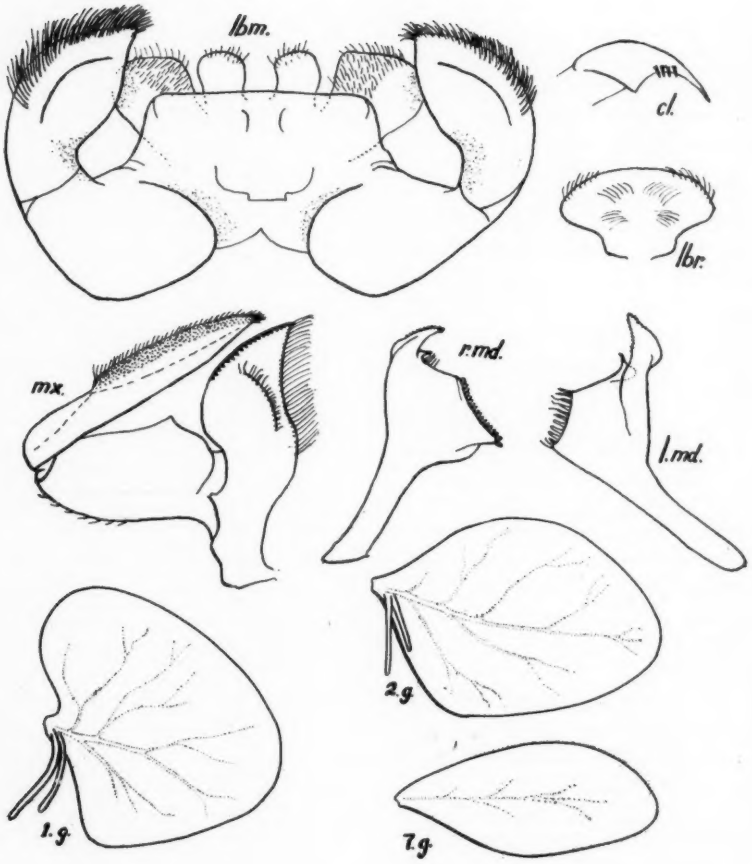
Nymph with three setae. Gills, as usual, on first seven abdominal segments, pale, with only slight, indistinct tracheation and with the basal filaments *reduced to one or two* on the anterior gills; gill of segment I *largest,* heart-shaped, the ventral section tending to be slightly enlarged but not nearly to the extent found in *Rhithrogena*; remaining gills ovate, with that of segment VII smallest and oblongovate. Mouth-parts distinctly reminiscent of those of *Rhithrogena,* notably the mandibles and the maxillary palpus (see figure 3). Separable from both *Rhithrogena* and *Cinygma* on gill-structure and from the latter on structure of mouth-parts.

Adult. Separable from *Rhithrogena* on account of the much greater length of the first foretarsal joint in the male, which is very similar to that of *Cinygma.* Male genitalia with penes more or less rod-like, separate except at base, with stimuli placed subapically and frequently with lateral spine. (In *Cinygma* the penes are joined almost to apex as in *Heptagenia* and the stimuli are minute and situated near base.)

Genotype, Ecdyurus ramaleyi Dodds.

The nymph of *ramaleyi* has already been described by Dodds (1923, Trans. Am. Ent. Soc. XLIX, 101) and the adult genitalia figured (Pl. VIII, fig. 9). A figure of the nymph is given in Ecology, V, Pl. II, fig. 10, 1924. The figures I give in the present article add supplementary details of structure in gills and mouth-parts.

In conclusion it might be well to mention two papers which have appeared recently, dealing ostensibly with nymphs of *Cinygma* species. The first of these by Dr. Needham (1927, Can. Ent. LIX, 133/6) was based on a misassociation (as acknowledged to me by Dr. Needham *in litt.*) of adults of *mimus* Eaton with true *Rhithrogena* nymphs, probably of the species *doddsi* McD. This led to the wrong conclusion that the genus *Cinygma* should be sunk to *Rhithrogena.* The



Structural details of the nymph of *Cinygmula ramaleyi* Dodds.

second paper by F. P. Ide (1930, Can. Ent. LXII, 42/45) dealt with the nymph of *Cinygma bipunctata* McD., a species which now, due to Ide's nymphal studies, has been correctly removed (1930, Can. Ent. LXII, 229) to the genus *Arthroplea* Bgtssn.

FIVE NEW SAWFLIES OF THE GENUS *NEODIPRION* ROHWER

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The following descriptions of five sawflies of the genus *Neodiprion* are presented at this time in order that the names may be available for use in economic literature. Some of the specimens have been received from Dr. J. M. Swaine, Associate Dominion Entomologist, Entomological Branch, Department of Agriculture, Ottawa, Canada. All of the species are known to defoliate coniferous evergreen trees in forested areas in Canada.

Neodiprion (Neodiprion) tsugae n. sp.

A yellow-brown species with the flagellum dark brown to almost black and blackish markings on the thorax. This species belongs to the group which has the scutellum polished and impunctate and is related to *N. abietis* (Harris), *N. edwardsii* (Norton), and *N. scutellatus* Roh., but may be separated from them as follows: In *N. tsugae* and *N. abietis* the pads of the sheath are short and oval, about twice as long as wide, only about one-third the length of the portion of the sheath of which they form a part, and distinctly on the apex of the sheath; in *N. edwardsii* and *N. scutellatus,* however, these pads are about three times as long as wide, about one-half the length of the portion of the sheath of which they form a part, and distinctly on the longitudinal aspect of the sheath. The female of *N. tsugae* can be distinguished from that of *N. abietis* by having shorter rami on the flagellum. The rami on joints 2 to 9 of the flagellum of *N. abietis* are as long as the joints are thick, whereas the rami of the flagellum of *N. tsugae* are shorter than the joints are thick.

Female: Body length 6.5 mm. Head: Width 1.6 mm., height 1.3 mm.; antenna about 2 mm. long, 18-jointed; rami of the flagellum short, not as long as the segments are thick, rather pointed; labrum polished, anterior margin rounded; clypeus highly polished, especially the lower half, which is for the most part impunctate, almost without hairs, and shallowly transversely impressed, anterior margin broadly and very shallowly arcuately emarginate, upper half distinctly punctate; clypeus distinctly separated from the supraclypeal area by an impressed, straight, transverse suture; supraclypeal area strongly convex, less distinctly punctate than the rest of the face; median fovea almost obliterated; front shining and punctate, slightly but distinctly convex between the antennal furrows and below the postocellar line, with a distinct, smooth, circular depression immediately below the median ocellus; postocellar area three times as wide as median length, strongly convex, and sharply defined; postocellar line longer than the ocellocular line.

Thorax: Pronotum and propleura shining, not distinctly punctate, not polished, prescutum shining, shallowly and rather evenly punctate over the anterior two-thirds, the angle of the posterior third rather sharp, the median suture distinct throughout and becoming a weak carina in the posterior fifth; scutum shining but uniformly and finely punctate; scutellum impunctate, smooth and

shining, slightly longer than wide, posterior margin somewhat angular, anterior margin an angle slightly less than a right angle, the anterior three-fourths of the scuto-scutellar furrow deeply impressed; mesepisternum shining, almost impunctate, metascutellum polished, not distinctly punctate.

Abdomen: Basal plates shining and with a few scattered punctures; sheath with the pads oval, short, about twice as long as wide, and distinctly on the apex of the sheath rather than on the longitudinal aspect.

Color of head: Yellowish brown except as follows: Scape and pedicel of the antenna brown, flagellum dark brown to blackish; postocellar furrow and area about the lateral ocelli black.

Color of Thorax: Pronotum pale yellowish; propleura yellowish, with a black dorsal margin; prescutum yellow brown, with a large black, triangular mark covering the center of the anterior half; scutum yellow brown, with a long blackish longitudinal stripe extending posteriorly from the exterior angle of the prescutum and a small black spot about midway between the stripe and the anterior angle of the scutellum; scutellum yellow brown, with the margins darkened, especially the posterior margin; metascutellum dark brown to almost black; mesopleura and metapleura yellowish; legs pale yellowish; wings hyaline, faintly iridescent, venation brownish, the stigma and costa pale brown.

Color of Abdomen: Basal plates and last two tergites yellowish brown, rest of tergum dark brown; pleurum pale yellowish; venter light yellow brown, sheath with basal portion light yellow brown and apical portion yellow brown.

Male: Body length 6.3 mm. Head: Width 1.6 mm., height 1.2 mm.; antenna 20-jointed, the flagellum biramose except for the uniramose 1st, 16th, and 17th joints and the 18th or apical joint, which is bead-like; labrum rounded apically; clypeus distinctly separated from the supraclypeal area by an impressed line, very shallowly arcuately emarginate apically, apical half highly polished and somewhat flattened, basal half with punctures somewhat more coarse than on the supraclypeal area; supraclypeal area convex, punctate laterally close to the antennal sockets; median fovea wanting; front and vertex roughened by dense and coarse punctures; median ocellus with a distinct inverted U-shaped fovea encircling three sides from above and a longitudinal line-like smooth fovea immediately below; postocellar area strongly convex and very well defined, about two and one-half times as wide as median length, not divided medianly; postocellar line longer than the ocellocular line.

Thorax: Pronotum densely and coarsely punctate, much more densely and coarsely punctate and less shining than the mesoscutum; prescutum and scutum uniformly and rather finely punctate; scutellum rather longer than wide, the anterior angle slightly more acute than a right angle, almost impunctate except for the posterior margin, where the punctures are very shallow, sparse, and indistinct; mesepisternum uniformly and very finely punctate; punctation of metascutellum like that of the scutellum.

Abdomen: Tergites polished and almost impunctate except for a few distinct but shallow punctures on the basal plates; pleurites shallowly and rather densely punctate; sternites shallowly punctate beyond the middle; the hypandrium more densely and distinctly punctate than the sternites and with the posterior margin very broadly and shallowly rounded.

Color of head: Black, except the labrum, which is yellowish brown.

Color of thorax: Black, except the legs, of which the coxae are black but the remaining joints yellowish in the front legs and yellowish brown in the middle and hind legs; wings hyaline and distinctly iridescent, the veins blackish.

Color of abdomen: Black.

Described from ten females (one type) and three males (one allotype). The female paratypes vary from the type as follows:

Body length 6.5 to 7 mm. Antennae with 18 joints on two specimens with 17 joints on five specimens, two of which lack complete antennae on one side. In three specimens the postocellar area is but slightly more than twice as wide as its median length. In one specimen the dark markings are wanting on the prescutum and but very faintly indicated in brown on the scutum. The anterior angle of the scutellum in one specimen (pinned through the scutellum) is slightly greater than a right angle and in three others it is a right angle. In the specimens with the anterior angle of the scutellum acute, the scutellum appears slightly longer than wide; in the others, about equal in length and width. Four specimens have the metascutellum yellowish or brownish. Three specimens have the abdominal tergites dark yellowish brown.

Host plant—western hemlock, *Tsuga heterophylla* (Rafin.) Sarg.

Type locality.—Carroll Inlet, Tongass National Forest, Alaska (type, allotype, and seven female paratypes), and Queen Charlotte Island, B. C. (two female and two male paratypes). The specimens from Carroll Inlet were reared from cocoons collected August 12, 1920, by C. T. Gardner; those from Queen Charlotte Island were received through J. M. Swaine and labelled "12, ix.31, G. Hopping, *Tsuga heterophylla*, 17403.".

This species is also represented in the collection of the U. S. National Museum by the following additional specimens, which are not included in the type series: Five females labeled "Astoria, Ore., 9-22;" one female labeled "Reared from thimbleberry[1] (*Rub. parviflorus* Muth), Neah-Ka-Nie Mt., Ore., VII-20-17, E. J. Newcomer collector, Quaintance No. 14108;." one female labeled "Ketchikan, Alaska, 9-8-1919, H. G. Dyar collector, on hemlock twig.'.'

Neodiprion (Neodiprion) rugifrons n. sp.

Related to *N. eximina* Roh. and *N. swainei* Midd. It may be distinguished from *eximina* by the less uniformly and distinctly punctate prescutum and scutum, by the sparsely, coarsely punctate scutellum (the scutellum of *eximina* is densely punctate), and by the shallow and indistinct median fovea. It may be separated from N. *swainei* by the position and size of the pads on the sheath.

As represented by the female, it is a dark species, with brown head, dark brown prescutum and scutum, yellowish, coarsely punctate scutellum, and dorsally black abdomen.

Female: Body length 7.6 mm. Head: Width 2 mm., height 1.7 mm.; antenna 2 mm. long, 18-jointed, rami of flagellum simple throughout, the longer rami (flagellar joints 3 to 7) about equal to the length or breadth of the joint; labrum with fine punctures on the rounded apical margin; clypeus distinctly separated from the supraclypeal area by a straight, transverse suture, anterior half polished, posterior portion punctate, anterior margin distinctly arcuately

[1]This plant record probably refers to a place selected by the larva for cocooning.

emarginate; supraclypeal area convex, coarsely and densely punctate; lateral supraclypeal area similarly sculptured; median fovea shallow and indistinct; front uniformly coarsely and densely punctate; ocellar fovea shallow, circular in outline; postocellar area sharply defined, gently and uniformly convex, its width about 1½ times median cephalocaudad length; vertical furrows nearly parallel medianly, converging slightly anteriorly and rather strongly posteriorly; vertex coarsely punctate but less densely than the front.

Thorax: Pronotum shining and sparsely punctate; propleura uniformly and moderately punctate; prescutum finely and uniformly punctate over the anterior two-thirds, sparsely punctate in the posterior third; scutum faintly, irregularly punctate; median two-thirds of scuto-scutellar suture deeply impressed; scutellum broader than long, anterior margin an obtuse angle of about 100°-110°, moderately punctate with large, distinct, circular to oval punctures; metascutellum slightly declivous anteriorly, coarsely and sparsely punctate on the posterior margin; mesepisternum smooth along the anterior margin, coarsely and densely punctate laterally, the punctures becoming smaller and not so close together ventrally.

Abdomen: Dorsum almost impunctate; pleura and venter with scattered shallow, indistinct punctures; pads of sheath long and oval, presenting a flattened surface on the longitudinal aspect of the sheath, three times as long as wide, and about two-fifths the length of distal portion of sheath, separated from the median ridge by less than half their width.

Color of head: Reddish brown except as follows: Labrum yellow; antennae dark brown; front broadly above antennae, along the antennal furrows, and about the ocelli below the postocellar furrow black; vertical furrows dark brown.

Color of thorax: Pronotum yellow; prescutum yellow brown, with a large, dark brown, triangular area on the anterior median two-thirds; scutum dark brown; scutellum yellow with black margins; metascutellum brown to blackish; propleura very dark brown; mesepisternum yellowish brown; legs brown, femora somewhat darker, prothoracic and mesothoracic coxae yellower than hind coxae; wings hyaline, iridescent, veins dark brown.

Color of abdomen: Dorsum glistening black; pleurum whitish to the nates, which are reddish brown; sternites, except the last two, whitish medianly, the lateral margins, the last two sternites, and the sheath reddish brown.

Described from three females, one type and two paratypes, reared by K. E. Schedl.

Host plant.—Jack pine (*Pinus banksiana* Lambert).

Type locality.—Biscotasing, Ont.

The type and paratype are in the U. S. National Museum (Cat. No. 44846). One paratype has been returnd to the Entomological Branch, Department of Agriculture, Dominion of Canada, for deposit in the Canadian National Collection.

Neodiprion (Neodiprion) nigroscutum n. sp.

Closely allied to *N. rugifrons* but differing as follows: Pentagonal area sparsely punctate; the longer flagellar rami shorter than their joints are wide; scutum distinctly black; front darkened only on the antennal furrows just above the antennae.

Female. Body length,, 7 mm.

Head: Width, 2 mm.; height, 1.7 mm.; antennae 2 mm. long, 19-jointed, rami of flagellar joints simple, those of joints 3 to 6 as long as the joints; labrum with apical margin rounded, not distinctly punctate; clypeus separated from the supraclypeal area by a distinct transverse suture, anterior third somewhat declivous and smooth and polished, posterior two-thirds not smooth or polished but not distinctly punctate, anterior margin distinctly arcuately emarginate; supraclypeal area convex, not distinctly punctate, lateral supraclypeal area coarsely, irregularly punctate, some punctures confluent; median fovea shallow and indistinct; front with distinct, coarse, separate punctures which are widely separated medianly; ocellar fovea distinct, oval in outline; postocellar area sharply defined, its width twice the median cephalo-caudad length, gently and uniformly convex; vertical furrows curved; vertex less densely punctate than front.

Thorax: Pronotum sparsely but distinctly punctate; propleura uniformly, finely punctate; prescutum finely and uniformly punctate over the anterior half, posterior half with a very few indistinct large and shallow punctures; scutum very distinctly punctate, the punctures of moderate size (larger than those on the anterior of the prescutum); median two-thirds of scuto-scutellar suture deeply impressed; scutellum broader than long, anterior margin an obtuse angle of about 100°-110°, moderately punctate with large, distinct, oval and circular punctures; metascutellum not distinctly declivous anteriorly, coarsely and densely punctate; mesepisternum smooth along the anterior margin, with large, coarse, dense punctures laterally, punctures smaller and less dense ventrally.

Abdomen: Dorsum almost impunctate; pleura and venter with scattered, shallow, indistinct punctures; pads of the sheath long and oval, presenting a flattened surface on the longitudinal aspect of the sheath, three times as long as wide, and about two-fifths the length of the distal portion of sheath, separated from the median ridge by not more than half their width.

Color of head: Reddish brown; labrum yellow; antennae dark brown; antennal furrows above the antennae dark brown; about the ocelli blackish.

Color of thorax: Pronotum yellow; prescutum dark brown, posterior fourth yellowish; scutum black; scutellum yellow, with a black margin posteriorly; metascutellum dark brown; propleura very dark brown; mesepisternum yellow, darker brown ventrally; legs brown, trochanters pale, metathoracic and mesothoracic coxae blackish basally; wings hyaline, iridescent, veins dark brown.

Color of Abdomen: Dorsum blackish except for yellowish marks subdorsally on basal plates and yellowish apex and anal tergite; pleurum whitish; nates reddish brown; sternites, except the last, yellowish medianly, lateral margins and the last sternite reddish brown; sheath reddish brown.

Described from three females, one type and two paratypes, reared by K. E. Schedl.

Host plant.—Jack pine (*Pinus banksiana* Lambert).

Type locality.—Biscotasing, Ont.

The type and paratype are in U. S. National Museum (Cat. No. 44847). One paratype has been returned to the Entomological Branch, Department of Agriculture, Dominion of Canada, for deposit in the Canadian National Collection.

Neodiprion (Neodiprion) ferrugineum n. sp.

Almost entirely brown, related to *N. pinetum* (Nort.) but separated by uniformly distinctly punctate prescutum and scutum (in *N. pinetum* the punctation of these sclerites is not distinct), by the reddish brown abdomen (in *N. pinetum* the dorsum of the abdomen is distinctly darker beyond the second tergite), and by the subequal basal joints of the flagellum (*N. pinetum* has joint 1 of the flagellum one and one-half times the length of joint 2).

Female. Body length 8 mm.

Head: Width 2.2 mm., height 2 mm.; antenna 2.2 mm. long, 19-jointed, rami on flagellar joints 3 to 12 depressed medianly, the interior portion shorter and less distinct than the exterior, exterior portions on flagellar joints 3 to 7 as long as the length of the joints, rami on flagellar joints 1 and 2 and 13 to 15 simple; labrum with anterior margin semicircular; clypeus separated from the supraclypeal area by a transverse suture, anterior half smooth and declivous, anterior margin very shallowly emarginate; supraclypeal area not sharply defined dorsally, gently convex, coarsely coriaceous; lateral supraclypeal areas uniformly coarsely coriaceous; median fovea wanting; front distinctly coarsely punctate, the punctures deeper and closer together near the ocellocular line; antennal furrows distinct, shallow; pentagonal area sharply raised; vertex with large, distinct, well-separated punctures, more widely separated medianly; postocellar area twice as wide as median length, distinctly convex, and well defined; vertical furrows straight and parallel; postocellar furrow curved.

Thorax: Pronotum shallowly, coarsely punctate; prescutum punctate, the punctures finer and more distinct on the anterior median half; scutum distinctly punctate throughout but punctures finer on the anterior portion; scutellum very coarsely and deeply punctate, especially on the lateral and posterior two-thirds; metascutellum declivous anteriorly and with a few rather coarse punctures at the sides; mesepisternum coarsely punctate laterally, the punctures disappearing anteriorly, much finer and sparser ventrally.

Abdomen: Tergites practically impunctate dorsally, faintly punctate on the pleurum; sternites faintly punctate; pads of sheath long and broad, three times as long as wide, separated from each other by about their width and from the median ridge by not more than half their width.

Color of head: Reddish brown; lateral angles of clypeus beneath tentorial fovea blackish; antennae very dark brown; antennal furrows from antennae to lateral ocelli blackish; postocellar furrow and area about ocelli blackish.

Color of thorax: Brown; the sutures blackish; pronotum yellowish brown; prescutum and scutellum reddish brown; scutum slightly darker; metascutellum reddish brown; mesepisternum yellowish brown, with a reddish tinge ventrally; legs reddish brown, coxae, trochanters, and base of tibiae paler; wings hyaline, veins dark brown.

Color of abdomen: Tergites reddish brown on dorsum, pleura white about spiracles and reddish brown below; nates reddish brown, sternites reddish brown; sheath dark reddish brown.

Described from one female, the type, and two paratypes reared by K. E. Schedl.

Host plant.—Jack pine (*Pinus banksiana* Lambert).

Type Locality.—Biscotasing, Ont.

The type and paratype are in U. S. National Museum (Cat. No. 44848). One paratype has been returned to the Entomological Branch, Department of Agriculture, Dominion of Canada, for deposit in the Canadian National Collection.

Neodiprion (Neodiprion) ontarioensis n. sp.

Related to *N. banksiana* Roh. but distinguishable from that species as follows: "It is smaller, about 7 mm. long (*banksiana* is about 8 mm. long); the head, scutellum, and abdomen are yellow brown (in *N. banksiana* the head, scutellum and abdomen are paler and more distinctly yellow); and the antennae are 18-jointed (in *banksiana* the antennae are 20-jointed).

Female.—Body length 7.1 mm.

Head: Width, .9 mm.; height 1.5 mm.; antenna 2 mm. long, 18-jointed, rami of flagellar joints 4 to 12 depressed medianly, exterior portion of rami longer and more distinct, never longer than one-half width of joint; labrum short, not half the length of clypeus, apical margin curved; clypeus separated from supraclypeal area by a straight, transverse suture, anterior two-thirds declivous, anterior half polished, posterior half coriaceous, anterior margin distinctly arcuately emarginate; supraclypeal area convex, coriaceous; lateral supraclypeal area densely, coarsely, shallowly punctured; median fovea present but neither deep nor with well defined margins; pentagonal area raised and well defined, uniformly coarsely, densely punctate as is rest of front; vertex not so densely punctured as front; postocellar area well defined, its width about two and a half times the median length, gently convex; postocellar furrow curved.

Thorax: Pronotum with rather large irregular punctures, sparser ventrally; prescutum finely but distinctly punctate on median anterior two-thirds, almost impunctate on the lateral margins; scutum distinctly, uniformly punctate, punctures larger than those on prescutum; the scuto-scutellar suture forming an angle slightly greater than a right angle, the anterior two-thirds deeply impressed; scutellum very coarsely punctate over the lateral and posterior two-thirds, broader than long, the posterior margin of the scutellum slightly angulate; metascutellum hardly declivous anteriorly, with a few faint, coarse, punctures posteriorly; mesepisternum densely, coarsely punctate laterally, punctures finer ventrally, anterior margin and venter almost impunctate.

Abdomen: Basal plates with a few indistinct punctures; pleurum of the tergites, including nates, sparsely, indistinctly punctate; rest of tergites polished and impunctate; sternites with a few faint punctures; pads distinctly pads, long and narrow, five times as long as wide, as long or slightly longer than basal rods, separated from median ridge by at least width of the pads.

Color of head: Yellow brown, antennae blackish, antennal furrows from antennae to ocelli very dark brown, area about ocelli below and including postocellar furrow very dark brown to blackish.

Color of thorax: Pronotum yellowish; propleura yellowish with a blackish dorsal margin; prescutum dark brown, lateral margins yellowish; scutum dark brown, extreme anterior fifth blackish; scutellum yellow, the posterior margins narrowly darkened; metascutellum brown; mesepisternum yellowish dorsally, almost black ventrally; legs yellowish brown, trochanters and apical portion of coxae pale; wings hyaline and iridescent, veins brown.

Color of abdomen: Tergites dorsally yellowish brown (3 to 6 darker than rest), whitish laterally; nates reddish brown; sternites yellowish brown, the sides, especially of last sternite, darker brown; basal portion of sheath reddish brown, about the same color as nates, apical portion dark brown.

Described from three female specimens, the type and two paratypes, reared by K. E. Schedl.

Host plant.—Jack pine (*Pinus banksiana* Lambert).

Type Locality.—Biscotasing, Ont.

The type and paratype are in the U. S. National Museum (Cat. No. 44849). One paratype has been returned to the Entomological Branch, Department of Agriculture, Dominion of Canada, for deposit in the Canadian National Collection.

NOTES AND NEW SPECIES OF MICROLEPIDOPTERA FROM WASHINGTON STATE

BY J. F. G. CLARKE,
Department of Zoology, State College of Washington.

Agonopteryx serrae sp. nov.

Antennae light fuscous; distal end of the basal joint of antennae, palpi, head, patagia, thorax, and ground color of fore wings yellowish wood-brown. Terminal joint of palpus with a broad fuscous annulation. Fore wings variously marked with blackish fuscous; near base a fuscous patch which fades distally and becomes fused with ground color; a large fuscous discal spot which in some specimens (females) is almost black which gradually fuses with the ground color on all sides; before this, two small black spots; beyond, one black spot; costa somewhat spotted with fuscous; from costa near apex around termen to the inner margin 11 small black spots. In some specimens these are somewhat obscured. Cilia light grayish fuscous tipped with buff. Hind wing light fuscous, darker toward apex. Cilia light grayish fuscous, buff tipped. Abdomen yellowish wood-brown below with two fuscous longitudinal stripes; above, brownish fuscous, some scales tipped with the light yellowish wood-brown. Legs yellowish, wood-brown; above more fuscous, tarsi especially so; spurs fuscous.

Male genitalia with harpes almost entirely clothed with fine spines; cucullus with several long, heavy marginal spines; sacculus moderately chitinized, folded, and giving rise to a slender, straight finger-like process. Anellus a small, lightly chitinized plate with lightly spined lobes laterally. Aedoeagus short, stout, abruptly sharp pointed. Transtilla a smooth band. Gnathos produced in a heavily spined cone. Tegumen with apex broad, socii small, indicated by a few hairs. Vinculum rounded.

Female genitalia with bursa oval, gradually tapering into ductus; signum a small oval plate.

Alar expanse: 17-23 mm.

Type: U.S.N.M. No. 44740.

Type locality: Pullman, Washington.

Food plant: *Senecio serra* Hook.

Described from the male type, 5 ♂ ♂ and 4 ♀ ♀ paratypes, all reared. Paratypes in U. S. National, Canadian National, H. H. Keifer (Sacramento, California), and author's collections.

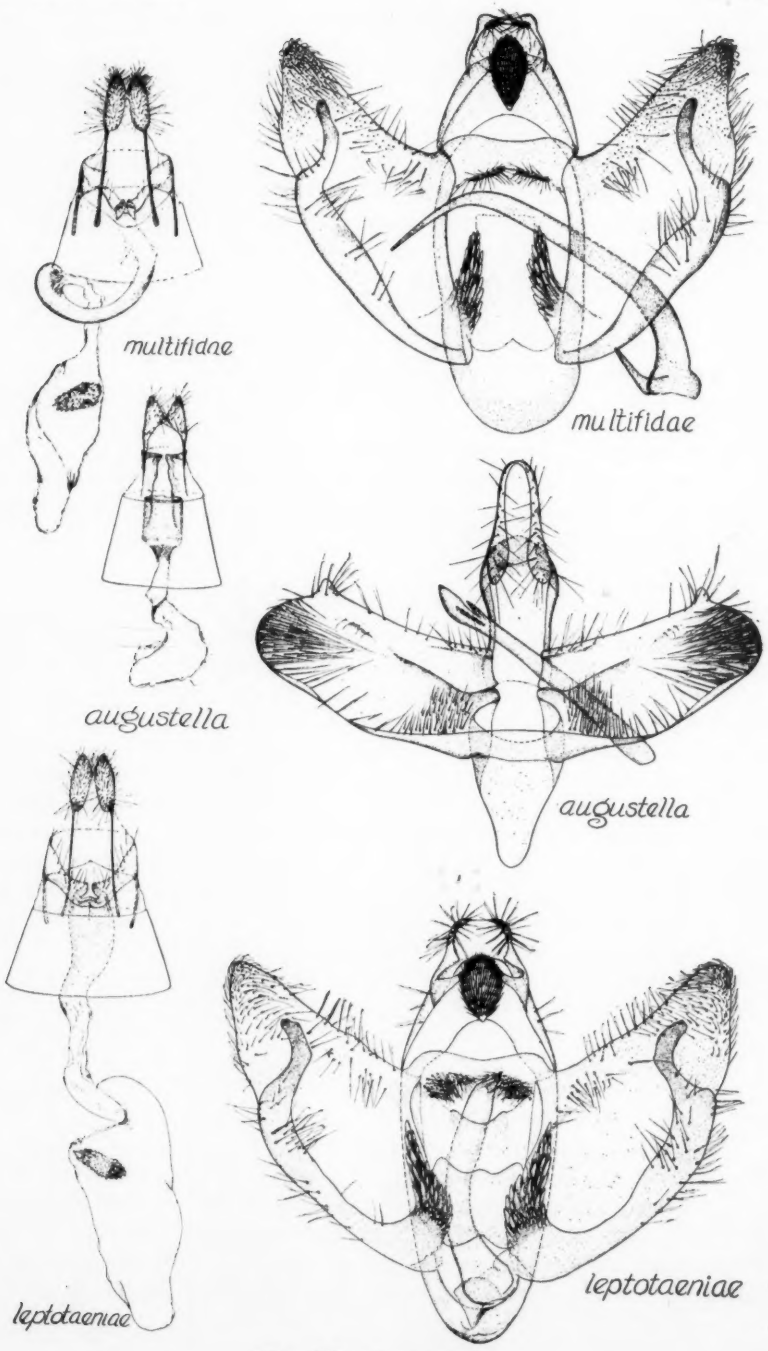
Larva 12-15 mm. when mature. Head ochreous-tawny, ocellar group black. Prothoracic shield black laterally and posteriorly; anteriorly fading to a light green; dorsally there is a narrow green line bisecting the shield. First thoracic segment light bice-green; second and third thoracic, and abdominal segments green, overlaid with deep brownish drab, the color becoming more intense posteriorly. Suranal plate light eosine pink, dorsally, somewhat mottled with light brown and light green. Legs light yellowish. Spiracles and tubercles black.

The larvae of this species were collected on June 5, 1932. Feeding begins in the terminal leaves of the food plant. These are webbed together to form a tube for the young larva which feeds at the outer ends of the leaves. As feeding progresses and the larva nears maturity, it descends the plant to some of the nearby lateral leaves in which it completes its feeding by rolling the edge of one of the leaves to form a tube. When feeding has been completed, the larva descends to the ground, burrowing just beneath the surface and forming a small cell in which to pupate. Pupation usually occurs 2 or 3 days after the larva has entered the soil. Of nine larvae which were observed and from which adults were obtained, the pupation period was for 5 specimens 12 days, 2, 13 days, and one, 14 days.

Depressaria multifidae sp. nov.

Antennae blackish-fuscous, faintly annulated with grayish-fuscous; basal joint shining black above, olive-buff below. Palpi, tuft blackish-fuscous below, olive-buff above; terminal joint black-fuscous, with a few scattered scales and extreme tip olive-buff. In some specimens the olive-buff becomes very pale. Head light fuscous, scales tipped with gray. Thorax and patagia blackish fuscous anteriorly fading to drab posteriorly. Fore wing from fuscous-black to light fuscous mixed with drab colored, and a few scattered olive-buff scales; extreme costal edge olive-buff, (in some specimens this color is scarcely perceptible); at extreme base, in anal angle, a patch of jet black scales with a suggestion of purplish iridescence; in cell, just beyond middle, a small patch of olive-buff scales; before this spot a dash of black scales, sometimes almost obscured by ground color; in a few specimens a suggestion of an outwardly curved, narrow, light fucous fascia just beyond the small light discal spot; a few faint blackish-fuscous dashes following the veins and small indistinct spots on apical margin; cilia grayish-fuscous. Hind wings light fuscous, darker toward margins; cilia very light shining fuscous. Abdomen fuscous, with the posterior edges of the segments greyish dorsally; below along midline a broad olive-buff band. Legs fuscous heavily overlaid with olive-buff.

Harpes with a moderately chitinized, inwardly folded sacculus giving rise to a moderately chitinized, slender, finger-like process gently curved toward the cucullus. Anellus an oblong, lightly chitinized plate with heavily chitinized spine clusters which fuse with the sacculus. Transtilla a weakly chitinized, broad band. Aedoeagus long, slender, and strongly curved distally; basally slightly enlarged and attached to anellus by a short strong arm. Gnathos a heavily spined oval



NEW MICROLEPIDOPTERA.

knob. Tegumen blunt, slightly bilobed; socii small, mainly indicated by the hairs. Vinculum moderately broad, rounded.

Female genitalia with bursa oblong oval; signum an oval, heavily spined curved plate. Ductus bursae with a heavily chitinized, curved mid portion. Genital plate heavily chitinized, with two lateral triangular processes.

Alar expanse: 19-21 mm.

Type: U.S.N.M. No. 44741.

Type locality: Snake River, opposite Clarkston, Whitman Co., Washington.

Food plant: *Leptotaenia multifida* Nutt.

Described from the male type, 3 ♂ ♂ and 2 ♀ ♀ paratypes, all reared and from the type locality. Paratypes in U. S. National and author's collections.

Larvae 15-16 mm. Head dark elm green. Prothoracic shield black. Thoracic and abdominal segments cedar green with a dorsal and broad lateral stripes dark elm green. Tubercles light green with the point of insertion of the hairs and setae black. Suranal plate light yellowish green.

The larvae of *multifidae* were collected May 8, 1932. They were first noticed when the writer observed openings at the bases of the umbels on the flowers of the food plant. On examining the flower stalks, numerous larvae and pupae were detected. The larvae apparently begin feeding in the sheaths of the young unopened flowers, frass and injured tissue being quite noticeable and attributable to these larvae, the habit being the same as that for *leptotaeniae*. After feeding in the sheaths, the larvae enter the flower stalks near the bases and feed up the stalks, until near maturity. When mature and just preceding pupation, the larvae cut holes in the bases of the umbels either through the top or just below the bases. Some slight webbing between the rays of the umbels may take place along with the deposition of some frass. After completing this work, the larvae retreat to points about 3 or 4 inches down the stalks, spin webs across the hollow tubes and there pupate, the pupae being attached by a few strands of silk to the platforms thus constructed and always having the anterior ends upward.

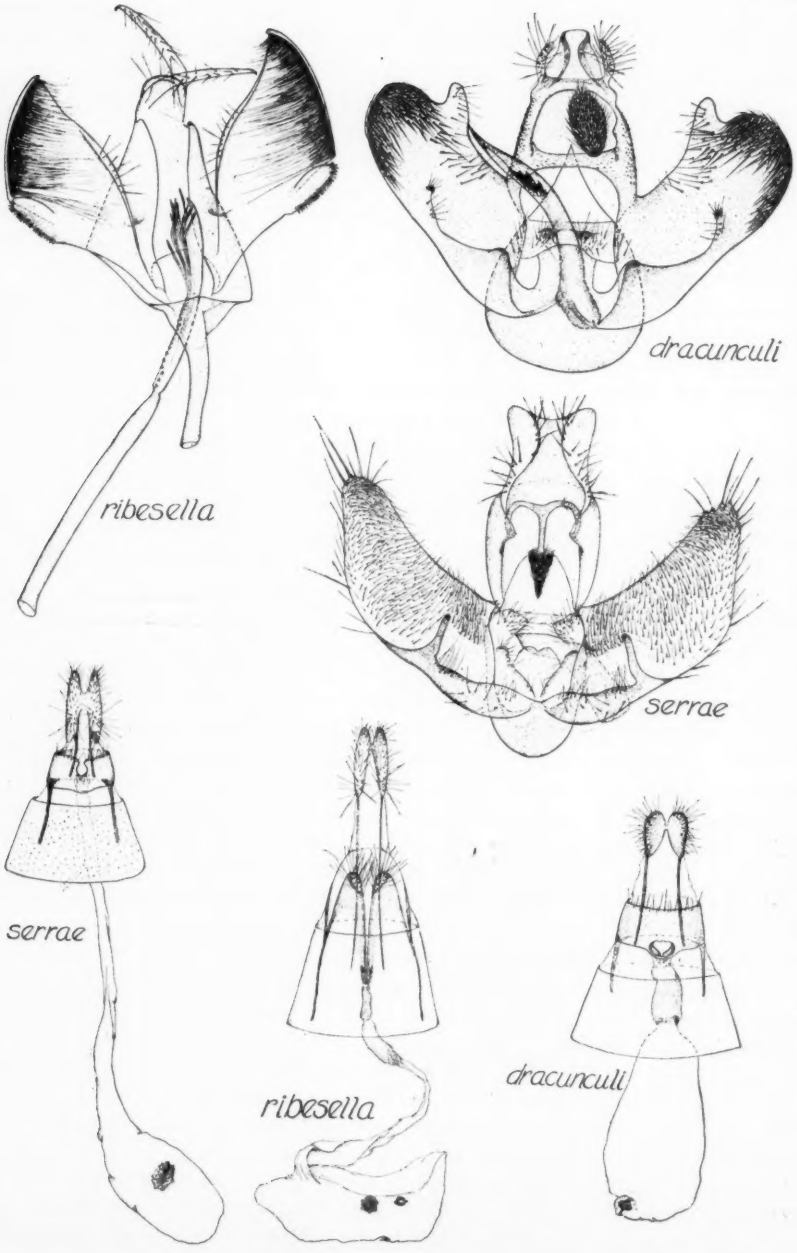
The species is very heavily preyed upon by both predators and parasites which gain access to the mature larvae or pupae through the before-mentioned exit holes. Several apparent adult parasites and predators were found in some of the stalks opened. Others, as yet undetermined, have been reared from the larvae.

Depressaria leptotaeniae sp. nov.

This and the foregoing species are almost indistinguishable as far as maculation of the adults is concerned. However, *leptotaeniae* differs from *multifidae* in that the costa is pink, if distinguishably differently colored from the rest of the wing, but never olive-buff as in *multifidae*. In the obscurely marked specimens, where the costal edges are not so marked, it is necessary to rely on genitalic differences and differences in habits to distinguish the two species. The light annulations on the tarsi of *leptotaeniae* usually show a faint tendency to pink, while those of *multifidae* are usually devoid of any pink color. The markings of *leptotaeniae* have a tendency to be more sharply defined than in *multifidae*.

Harpes with the sacculus moderately chitinized, folded and giving rise to a heavily chitinized finger-like process, abruptly curved toward cucullus.

CAN. ENT. VOL. LXV PLATE 5



NEW MICROLEPIDOPTERA.

Anellus consisting of a small rectangular, and a broad, almost square plate with short posterior lateral projections, the whole moderately chitinized. The anellus gives rise to two large, heavily chitinized spine clusters which are fused with the harpes at their bases. Aedoeagus short, sharp pointed and heavily chitinized; slightly curved. Transtilla a weakly chitinized broad band. Gnathos a heavily spined, oval knob. Tegumen rounded posteriorly; socii small. Vinculum narrow, rounded.

Female genitalia with bursa long, oval. Signum a heavily spined, curved oval plate. Posterior portion of ductus broad, heavily chitinized.

Alar expanse: 17-23 mm.

Type: U.S.N.M. No. 44742.

Type locality: Pullman, Washington.

Food plant: *Leptotaenia multifida* Nutt.

Described from the type, 5 ♂ ♂ and 10 ♀ ♀ paratypes, all reared and from the type locality. Paratypes distributed in the U. S. National, Canadian National, H. H. Keifer and author's collections.

Larvae of this species were collected in April of 1931 and 1932. From the former larvae no adults were obtained, but the following notes were made from them. The young larvae were found within webs spun inside the leaf sheaths. They varied in size and numbered from 3 to 20 within each sheath, where the first feeding takes place before the immature leaves unfurl. These first larvae were collected April 21, 1931, at Union Flat, Whitman Co., Wash. These larvae of apparently different ages, varied from light yellowish to jade green. The heads in the yellowish larvae were brown, in the green specimens, black. Subdorsal spots small, 2 on each segment, dark brown to black. Lateral spots, one to each segment, anteriorly, dark brown to black. The larvae were very active; 3 to 8 mm. in length. On April 25, 1931, some of the larvae left the sheaths to feed in the leaves. These underwent a moult just prior to leaving the sheaths. At this time the appearance of the larvae became altered and uniform as follows: head lime green with a few light brownish markings. Thoracic and abdominal segments kildare green with dorsal and subdorsal stripes, faint, yew green; bases of the tubercles very pale glass green. Legs yellowish. On April 29, 1931, the larvae began to abandon the leaves to pupate. Upon abandoning the sheaths, they spin small individual webs in the sheaths to form a tube. Feeding is accomplished by leaving the web. Frequently the larvae feed in the umbels, drawing the rays of the umbels together. The feeding in the flowers is accompanied by the production of a very sticky, viscid liquid which, together with frass, pollen and web, produces a very unsightly mass.

Pupation normally occurs in the soil but occasionally larvae will pupate in the leaves. For 15 of the 16 specimens of the type series, for which the data were obtained, the pupation periods were as follows: 12, 14, 14, 13, 13, 14, 13, 13, 14, 13, 12, 12, 12, 11, and 11 days. The consistent short period for the last five was perhaps due to the fact that the larvae for these pupated late in May and early in June, at which time the temperature was considerably warmer than it had been for the few preceding weeks. Pupation in all specimens ranged from May 17 to June 6 and emergence from May 30 to June 18, 1932. No pupation data were obtained on larvae collected in 1931.

Depressaria dracunculi sp. nov.

Antennae fuscous with grayish to white annulations. In one specimen the white is so profound that the fuscous is nearly obscured. Palpi, with tuft fuscous beneath, above creamy white; the white sometimes extends well down on the sides; terminal joint fuscous, with a creamy white tip and broad middle annulation. The white, in the lighter specimens, may cover the entire terminal joint, at least above. Head light fawn color, with the scales tipped with dirty white. Patagia and thorax light fuscous, with the scales tipped with gray to white, so much so that they appear gray, somewhat speckled with fuscous scales. Anteriorly the fuscous becomes more pronounced. Fore wings, dorsal two-thirds light to dark fawn color with a sprinkling of fuscous and grayish scales; costal third fuscous and gray mixed, appearing gray; the colors of the dorsal two-thirds and costal third merge and become attenuated toward apex; at base in anal angle a small blackish-fuscous patch; at junction of costal and dorsal areas, at the center of the wing, three blackish-fuscous dashes which sometimes fuse to form an obscure, single long dash. Cilia grayish fuscous with a broad darker basal area. Hind wings light grayish-fuscous. Cilia grayish with a light fuscous basal band. Abdomen silvery grayish above, fuscous with a mixture of creamy white scales, beneath. Legs fuscous heavily overlaid with creamy white. Tarsi narrowly annulated with creamy-white to gray.

Male genitalia with the cucullus heavily spined; sacculus moderately chitinized, broadly folded basally; a short rounded projection toward cucullus; costa having a broad, blunt pointed, slightly curved process. Anellus moderately haired with small lateral lobes. Aedoeagus long, gently and evenly curved, sharp pointed and containing 11 short, stout cornuti. Gnathos a heavily spined oval knob. Socii weakly chitinized, finger-like, haired processes. Tegumen narrow posteriorly. Vinculum broadly rounded.

Female genitalia with bursa large, oval; signum a small leaf shaped, short spined plate; ductus short, heavily chitinized.

Alar expense: 12.5-18mm.

Type: U.S.N.M. No. 44743.

Type locality: Snake River, opposite Clarkston, Whitman Co., Washington.

Food plant: *Artemisia dracunculus* Pursh.[1]

Described from the male type, 6 ♂ ♂ and 6 ♀ ♀ paratypes, all reared.

Paratypes in U. S. National, Canadian National, H. H. Keifer (Sacramento, California) and author's collections.

Adult larvae 10-12 mm. long. Head and prothoracic shield dark brown; the edges black. Thoracic and abdominal segments hellebore green. The body is slightly dorso-ventrally compressed, being thickest just before middle and gently tapering posteriorly. Bases of the tubercles and thoracic legs black.

The larvae of this species begin feeding in the terminal leaves of the new shoots. Their presence may be first detected by the sharply cut off appearance of the terminal leaves, the edges of which turn black, and a small amount of very fine frass. As the feeding continues, the larvae web three or four of the long

[1] *Artemisia dracunculus* Pursh. is synonymous with *A. dracunculoides* Pursh. The specific name of *dracunculus* is being retained here because of past reference to the species, but it is hoped that this note will eliminate any possibility of confusing the American species with that of the European species named *dracunculus* by Linnaeus.

slender leaves together to form a feeding tube. This tube of leaves, thus webbed together, becomes bent at the base and turns to one side to form a beak-like structure. The presence of this is quite readily detected. When the larva has completed feeding, it pupates in the ground. The writer hopes to publish further notes in the near future on this and other species attached to *Artemisia*.

Choreutis augustella sp. nov.

Antennae blackish-fuscous, with many long white scales and cilia intermixed. In the females the white is confined to the tips of the otherwise fuscous scales. Palpi, blackish-fuscous with numerous white tipped scales. Head, front gray to olive-buff; dorsally fuscous with scales olive-buff or white tipped. Thorax and patagia olive-buff to white with the scales fuscous centrally. In one female the white almost completely obscures the fuscous. Abdomen blackish-fuscous with a row of grayish scales posteriorly on each segment above and heavily scaled with white to olive-buff beneath; anal tuft black with a mixture of white tipped scales. Fore wing, basal third and a narrow band beyond white to olive-buff, the scales having fuscous centers; between the light basal patch and the outer light narrow band, a broad, dark olive-buff fascia; the apical third, with the exception of a small white to buff spot on costa and the metallic bars and spots of the same color, the scales all fuscous centrally. From costa, near the middle to the center of the wing, an outwardly oblique metallic bar edged inwardly with black; near basal third, from the center to dorsum, a short metallic bar edged with black; beyond this, near dorsum, a small metallic spot edged with black; another similar spot near the costa near center; ocelloid area a large black rectangular patch, vertically bisected by the light ground color which separates two large metallic spots, the inner one almost round, the outer vertically elongate; midway between the inner spot and costa another metallic spot; at apex an outwardly curved metallic crescent shaped dash inwardly edged with black. All the metallic scales are brilliantly iridescent. Cilia dark fuscous, white tipped, with a basal band of white tipped blackish-fuscous or black scales. Hind wing fuscous, cilia fuscous, white tipped with a dark basal band.

Male genitalia with vinculum, prolonged, spatulate; harpes heavily spined at cucullus and base; costa with a short, bluntly pointed process near cucullus. Aedoeagus long, straight, bearing one large, stout lateral spine and 10 short, stout dorsal spines near distal end. Uncus hood shaped, narrow. Socii lightly chitinized, long, finger-like.

Female genitalia with bursa small, signum absent. Ductus short, heavily chitinized posteriorly, greatly enlarged at ostium; a heavily chitinized and shortly-spined constriction just anterior to the final uniform enlarged portion of the bursa.

Alar expanse: 12-16 mm.

Type: U.S.N.M. No. 44744.

Type locality: Skyline Ridge, Mt. Baker Dist., Whatcom Co., Washington. 6200 feet altitude.

Food plant: *Senecio triangularis* Hook. and *Lupinus latifolius* var. *subalpinus* P. & R.

Described from the male type and 4 paratypes.

Paratypes in U. S. National and author's collection.

This species was reared from larvae found feeding on *Senecio triangularis* Hook. and *Lupinus latifolius* var. *subalpinus* P. & R., from the type locality, Chain Lakes, altitude 5000 feet, also in the Mt. Baker District, and from Round Pass, Mt. Ranier, altitude 4000 feet. The larva begins feeding at the base of the leaf, on the underside, drawing the edges together as it proceeds, and thus forms a rather large tube in which to feed. The upper epidermis, left intact, forms a protective covering for the larva and its web inside this feeding tube. In the case of the type male, which was reared from Lupine, the larva fed on the upper side of the Lupine leaves which were webbed together. In this case there was not the protecting cover formed as in the cases of the specimens found on *S. triangularis*. Some larvae pupate in the feeding tubes but many leave the tubes to pupate elsewhere. The writer observed many leaves in which feeding had taken place but which were devoid of larvae. Those observed in the rearing chambers were found to consist of the kinds which pupated in the leaves and those which pupated on the sides of the container. One female issued September 26, 1931, from a pupa formed on the 9th of that month. Another emerged September 2, 1931, the larva having pupated August 20, 1931. The type male was reared from one of two larvae collected August 26, 1932, in the type locality found feeding on the Lupine. On August 18, 1932, four larvae were collected at Round Pass, Mt. Ranier, Washington, from which one female was obtained. The larva pupated August 20, 1932, and the female issued August 31, 1932.

Besides the above mentioned specimens there is one specimen from McKinley Park, Alaska, in the U. S. National Collection, (F. W. Morand, collector), and one specimen from Mt. Hood, Oregon, altitude 5000 feet (author, coll.) taken on June 28, 1931.

A description of the larva is as follows: length 9-10 mm. Head setaceous; ocellar area brownish-black; mouth parts dark brown. Abdominal and thoracic segments light yellowish-green; tubercles and spiracles brownish-black. Suranal plate yellowish, with a broad whitish-green dorsal stripe. Legs brown.

I take particular pleasure in naming this fine species after Mr. August Busck, who is always ready to lend a helping hand with suggestions, welcome criticism or whatever may be necessary for the student.

Gracilaria ribesella Chambers

Antennae white beneath, blackish-brown above, toward base; tip white. Palpi whitish, heavily flecked with brown beneath. Head, patagia, upper part of thorax and ground color of fore wings orange-rufous with a few blackish scales scattered over the wings; cilia fuscous. Underside of fore wings dark fuscous. Hind wings and cilia light shining fuscous. Abdomen light shining fuscous above and orange-rufous beneath. Fore legs with femora orange-rufous inwardly, shining white outwardly; tibiae and tarsi blackish-brown flecked with white. Middle legs with femora white inwardly; orange-rufous outwardly at base gradually shading into blackish-brown distally; tibiae white inwardly, blackish-brown outwardly; tarsi white. Posterior legs white. Femora with an orange-rufous and brown spot outwardly.

There are several color varieties in which the color of the head varies from whitish to light fuscous. The color of the fore wings varies from the orange-fuscous of the type to tawny olive. There is a decided pink cast in some specimens, and in one male an almost complete black longitudinal line from the

base to the dorsal margin near the middle of the wing. In three specimens from Round Pass there is a small black spot in the center of the wing near the apex, preceded by a light longitudinal line.

Male genitalia with long narrow socii having a short hook at the distal end; harpes bilobed; a broad triangular upper lobe and a short oval lower part margined outwardly with short stout spines. Vinculum produced in a long bluntly pointed anterior process. Aedoeagus with several rows of short stout spines extending forward to a median constriction in the aedoeagus; penis bearing 11 long cornuti.

Female genitalia with the posterior portion of the ductus bursae quite heavily chitinized; signa two small irregular plates, one smaller than the other. Genital plate consisting of two arched, chitinized processes with numerous hairs at ostium.

Alar expanse: 14-20 mm.

Type: U.S.N.M. No. 44745.

Type locality: Marten Lake, Whatcom Co., Washington.

Food plant: *Ribes bracteosum* Dougl. Some larvae were induced to feed on *Ribes sanguineum* Pursh. when the supply of the normal food plant became exhausted.

Described from the type and twelve male and female paratypes, all reared from larvae found feeding on *Ribes bracteosum* Dougl., as follows: Marten Lake, Whatcom Co., Wash., altitude 5500 feet, (3 ♂ ♂ 9-10-ix-31, 5 ♀ ♀ 8-10-ix-31). Round Pass, Mt. Ranier, Wash., altitude 4000 feet (2 ♂ ♂ 7-8-ix-32, 2 ♀ ♀ 7-9-ix-32) all collected by the writer. On August 27, 1932, the writer collected a number of larvae on Skyline Ridge, Mt. Baker Dist., Wash., altitude 5000 feet, from which only one very much deformed adult issued.

Paratypes in U. S. National Museum, Canadian National Museum, collection of H. H. Keifer and author's collection.

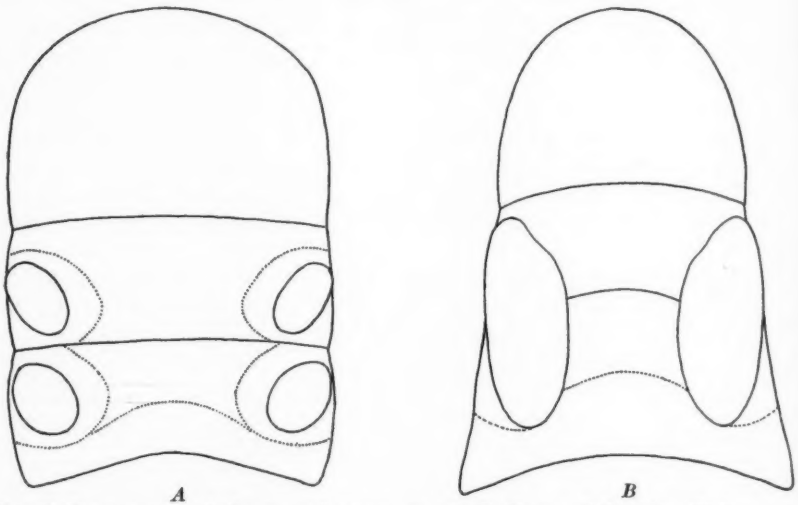
The species was named by Chambers (Bul. Geol. Surv. Terr., iii, 132, 1877), from larvae collected in Colorado, but the moth was not described, and he does not give the exact locality in which they were collected. Chambers states that the leaves of the food plant were tied together by the larvae. In no case was this found to be true of the larvae collected in Washington. The larvae in these cases form rather extensive webs, usually on the underside of the leaves, beginning at the bases and proceeding in all directions toward the margins. Frequently the leaves are completely skeletonized by the feeding of the larvae.

We note with much pleasure that at the Commencement exercises of the Manitoba Agriculture College on March 31, Mr. Norman Criddle, in charge of the Dominion Entomological Laboratory at Treesbank, Man., was granted an honorary diploma by the College, the highest honor in their power to bestow. Professor A. V. Mitchener, in a laudatory address, gave a complete review of Mr. Criddle's notable work on grasshoppers, wheat stem sawfly, Hessian fly and beet webworm.

A NEW BOREUS FROM BRITISH COLUMBIA (MECOPTERA)

BY F. M. CARPENTER,
Museum of Comparative Zoology, Cambridge, Mass.

In a collection of Mecoptera belonging to the Canadian National Museum and sent to me for determination by Dr. McDunnough, I was much surprised to find several specimens of an undescribed species of Boreus. Inasmuch as new species of North American Mecoptera are now rarely encountered and especially since this particular species is a most unusual one, I consider it justifiable to devote a separate paper to the description of this insect.



Thoracic Structure of *A. Boreus reductus* n. sp. and *B. Boreus Californicus* Pack.

Boreus reductus n. sp.

Figure 1A.

♂ : length of body, 1.8 mm.; uniformly shiny black, even the vertex and wings; outer margins of wings smoothly curved; posterior margin of hypandrium entire; rostrum long, about twice the length of the eyes. ♀ : length of body, 4 mm.; uniformly shiny black, even the eyes; ovipositor short (1 mm.), only about as long as the rostrum; fore wings reduced to the same size as the hind wings, merely consisting of a small oval scar.

Holotype (♂) and *allotype*: Kaslo, British Columbia, December 29, 1906, on snow; both in the collection of the Canadian National Museum, Ottawa.

Paratypes: 1 ♂, 1 ♀, Lillooet, British Columbia, January, 1917; collected by A. W. A. Phair; both in the Museum of Comparative Zoology, Cambridge. 1 ♀, Lillooet, January, 1917, in the Canadian National Museum.

As indicated in my figure, the thorax of *reductus* seems to be much broader than that of the other North American species of the genus, but this may not be a specific characteristic. The shape of the thorax in any specimen of Boreus depends largely upon the amount of shrinkage and distortion that takes place when the insect dries after being killed.

The male of this species is closest to that of *unicolor* Hine (Montana and Nevada) and it runs to that species in my key to the North American species of Boreus[1]. However, it is much smaller than *unicolor* and has a relatively longer rostrum; in *unicolor* the rostrum is hardly longer than the eyes, but in *reductus* it is nearly twice the length of the eyes. The female is at once separated from those of all other species of the genus by the reduced fore wings. In the females of the other species of Boreus the fore wings are in the form of oval pads, which extend backwards beyond the middle of the metathorax, completely concealing the scars of the hind wings (figure 1B). But in *reductus* the fore wings are as vestigial as the hind wings. So far as the structure of the wings is concerned, *reductus* is the most highly specialized member of the known Mecoptera.

(1) Revision of the Nearctic Mecoptera, Bull. Mus. Comp. Zool., (210):205-277, 1931.

NOTE ON THE HIBERNATION OF PHYCIODES GORGONE, HBN. (LEPIDOPTERA, NYMPHALIDAE)

BY R. H. HANDFORD.

Dominion Entomological Laboratory, Treesbank, Man.

In the "Canadian Entomologist" for September, 1915, T. D. A. Cockerell writes of *Phyciodes ismeria* (*gorgone* Hbn.) that the "species evidently hibernates as a larva." Observations in Manitoba have shown this deduction to be correct. A colony of larvae discovered on *Helianthus scaberrimus* Ell. (*rigidus* Desf.) in the Aweme district, July 20, 1928, hibernated in that stage, and one specimen successfully completed its development the following spring.

At the time the colony was collected the leaves of the plant were fairly thoroughly skeletonized, though the larvae would probably have had sufficient food to last for several more days. They were fed in the laboratory until July 28 when they suddenly ceased feeding and became so sluggish that they seemed to be dying. However, on the suggestion of Mr. Norman Criddle, they were retained until placed in outdoor hibernation quarters, Sept. 23. Thus they were inactive in the laboratory for practically two full months during which time they had every appearance of dead larvae.

When brought into the laboratory in the spring (May 6, 1929), five of them were still alive. Two that were placed in the garden on caged plants of *H. scaberrimus* moulted June 3 and began feeding, but they soon disappeared. Two others died in the laboratory. The remaining larva began feeding June 18, the day following its first spring moult. Having again moulted June 25 and July 2, it pupated July 13. The butterfly emerged July 21, but evidently the artificial rearing conditions had greatly retarded development, adults previously collected in the same locality bearing labels dated from June 7 to June 26.

BOOK NOTICE

Insects—Man's Chief Competitors. By W. P. Flint and C. L. Metcalf. 133 pages, 12 plates. The Williams and Wilkins Company, Baltimore, 1932. Price $1.00.

This small volume, written in a popular style, places before the general reader some of the important facts concerning insects and their habits. The early part of the volume deals with the ways in which insects are injurious to

man and his enterprises, and the methods employed by man in combatting them. This is followed by a section on the structure of insects and the distinguishing featuers of ten of the main orders,. The last part of the volume deals with six of the most widely known insect enemies of man, namely,—the grape Phylloxera, flea, ox warbles, hessian fly, cicada, Colorado potato beetle, and the cotton boll weevil. In each case the damage caused by the insect, its life history and control are discussed in a general way,

The popular style and the interesting manner in which many of the problems pertaining to insects are discussed in this volume should recommend it to the general reader. It will doubtless prove of particular interest to the teachers and students of agriculture and nature study in the public and high schools.—R. H. Ozburn.

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